STATE OF MONTANA
MONTANA DEPARTMENT OF TRANSPORTATION
JOB PROFILE

☑ Update

☐ Formal Review

Date Submitted _____

SECTION I - Identification

Working Title: Traffic Signal Operations Engineer

Department: Transportation

Job Code Number: 172517

Division & Bureau: Engineering/Traffic & Safety Bureau

Job Code Title: Civil Engineering Specialist

Section & Unit: Traffic Operations

Pay Band: 7

Work Address:
2701 Prospect Avenue
Helena, MT 59620

Position Number: 32011

Phone: 406-444-0091

☐ FLSA Exempt ☑ FLSA Non-Exempt ☑ Non-Union ☐ MPEA ☐ Blue Collar

Profile Completed By: Danielle C. Bolan

Work Phone: (406)444-7295

Work Unit Mission Statement or Functional Description:
The Traffic and Safety Bureau is responsible for all aspects of the development and design of highway safety and traffic engineering functions. It includes the Traffic Design, Traffic Operations, and Safety Engineering Sections.

The Traffic Operations Engineering Section is responsible for managing traffic in a safe and efficient manner throughout the State. The sections conducts and/or reviews all traffic analyses for the Department including capacity, traffic control, speed zones, and school crossing studies. The section provides analysis and recommendations related to traffic operations for construction projects and corridor studies to the Traffic Design Section, the Highways Bureau, the Consultant Design Bureau, the Planning Division, and District staff. The Section also provides expert consultation and review to consultants, developers, contractors, cities, counties, private citizens, and other state and federal agencies. The Section includes the Investigations, Engineering Analysis, and Traffic Signal Operations units.

The Traffic Signal Operations unit is responsible for the operation of all state maintained traffic signals. This section reviews signal designs; procures and managages state furnished signal equipment; and inspects, approves, and turn on new and/or upgraded traffic signals. This section also reviews, designs, optimizes, implements and fine tunes traffic signal timing plans.

Describe the Job's Overall Purpose:

Proper traffic signal timing promotes safe and efficient traffic flow. A well timed traffic signal system can reduce fuel consumption and emissions, eliminate unnecessary stops and delays, and increase safety.

This position develops traffic signal timing plans for signal networks on the state highway system. Signal timing requires the careful consideration of all highway users' needs and the balancing of competing interests to provide for the most safe and efficient operation possible. This job requires an advanced understanding of traffic engineering and an innovative approach to problem solving.

The position covers locations throughout the state and requires thorough knowledge of urban and rural transportation issues. The position must assess and effectively manage the multi-modal transportation needs of motorists, bicyclists, pedestrians, truck drivers, emergency vehicle operators, and mass transit users.

The position also provides support to the Intelligent Transportation Systems (ITS) coordinator by researching ITS technologies and assisting in the design and deployment of ITS components.

SECTION II - Major Duties or Responsibilities ***% of Time***

A. TRAFFIC SIGNAL OPERATIONS **90%**

1. Signal Timing

   This position develops traffic signal timing plans for corridors and isolated intersections across the state. Significant traffic engineering expertise and engineering judgment is required to effectively balance the safety and efficiency needs of the traveling public at traffic signals. Determining optimal timing plans is an intensive process that involves collecting, processing, and analyzing a large quantity of data.

   This position determines the scope of a project with input from the districts and communities. After a scope is determined, this position then plans and executes a data collection strategy. The data is used to develop a calibrated model that accurately represents the existing traffic signal operations in a network. This position then analyzes the existing scenario for potential improvements in signal timing (cycles, splits, offsets, etc.) or project developments (lane additions, phase changes, etc.) that could possibly improve the safety and operations of the signal(s). The development of a proposed signal timing plan is an iterative process that requires this position to make many independent decisions in the determination of an optimal signal timing plan. Upon completion of a opitimized timing plan, this position will implement the timing plan in the traffic signal controllers located in the field. A thorough review of the implemented timings takes place in the field and any necessary adjustments are made to the timings to account for any unanticipated conditions. After implementation, this position collects additional data to evaluate the success of the project.

   The signal timing process usually involves planning and implementing timing plans for typical traffic conditions. However, this position is oftentimes called upon to create special traffic signal plans for non-reoccurring congestion such as Black Friday shopping hours, University football games, and construction closures and detours.

   The process requires an extensive knowledge of multiple types of data collection strategies and techniques; several traffic signal timing software packages; and various traffic signal controllers and controller software. This position must also be able to effectively communicate the process

and results through written memos and reports as well as oral presentations to the districts, cities, and the public.

This position must develop innovative approaches to existing safety and operational problems with knowledge of engineering standards; community interests and concerns; local and regional government objectives; Departmental design, construction, and maintenance requirements; and other factors. This position is expected to be able to work independently with little direction. Oftentimes this position will be called upon to apply analysis and judgment to solve unusual and/or unprecedented technically challenging traffic safety and operational concerns.

2. Traffic Studies

This position performs other engineering studies regarding appropriate traffic control. These may include traffic signal warrant studies, roundabout analysis, and left turn phase studies. This position collects and analyzes data to make recommendations on the appropriate traffic control to be implemented or the appropriate traffic signal phasing. This position also uses traffic simulation/animation software programs to make recommendations regarding proposed programmed project details and construction phasing.

3. Policy Development

This position is heavily involved in the development of standards, policies, procedures, and practices for the State of Montana's traffic signal operations program. These policies and practices must conform to federal and state safety requirements. This position researches and reviews federal and state policy and procedures and provides recommendations for applications for the State of Montana with the goal of providing uniformity, consistency, and safety in signal operations philosophy and procedure. This position drafts policy memos for distribution to the department by the Traffic and Safety Bureau Chief.

4. Project Development

This position develops project priorities and estimates for the MACI-D Traffic Flow Improvements Projects. He/she must coordinate with the Planning Division and the various cities and counties to assess and assign project priority.

This position manages term assignments for signal timing projects completed by traffic term consultants. This position contacts the term consultant for a specific project, schedules a scoping meeting, reviews the scope of services and cost estimate. He/she will also develop their own in-house cost estimate based on the scope of services. A finalized scope of service and cost estimate is developed through negotiations with the term consultant. This position will review the work completed by the term consultant to ensure consistency with MDT practices and project objectives. Once final timings are approved, this position will implement the timing plans provided by the term consultant.

5. Expertise and Reviews

This position provides traffic signal operations expertise and consultation to District Offices, counties, governmental agencies, consultants, district traffic engineers, signal technicians, the Traffic Safety and Design Sections, and others during project development.

This position also fields traffic signal complaints from the public. He/she evaluates and investigates complaints and ensures timely follow up.

This position trains other engineers in the Traffic Operations unit on signal phasing, timing, theory, and practice. He/she provides technical expertise on the use of software programs for capacity analysis. He/she must have a thorough knowledge and understanding of multiple software packages and the advantages, disadvantages, and limitations of each.

6. Research

   The position researches and monitors continually changing methods, technologies, laws, and professional standards related to traffic signal operations and safety. As new technology is developed, the traffic signal and ITS fields are constantly evolving. He/she must stay current with technology and provide input to design to incorporate signal/ITS innovations into projects.

7. Reviews traffic engineering studies completed by consultants that are related to traffic control devices (traffic signals). This position provides technical expertise in the timing of traffic signals, phases used, actuation, etc. This is for both isolated intersections as well as traffic signal systems. This involves thorough knowledge of traffic signal timing programs and their limitations. The engineer must be able to use the programs to their fullest capability and at times be able to use the limited information available from the programs to develop innovative solutions to identified operational issues.

B. Other duties as assigned **10%**

Perform a variety of other technical, professional, and administrative duties in support of the Traffic Operations Section as assigned by the supervisor. This includes coordinating and performing special studies and projects, providing backup for the supervisor and other staff, representing the agency at meetings and conferences, and attending continuing education and training.

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1. ***The following duties and/or specific tasks listed under section II above are considered "essential functions" because they require specialized expertise and skill and are the primary reasons the job exists (they must be performed by this position with or without accommodations):***

   A. Traffic Signal Operations

   The following mental and physical demands are associated with these essential functions:

   PHYSICAL
   - Lifting objects up to 50 lbs.
   - Extensive travel throughout the state
   - Ability to walk over uneven terrain
   - Operation of power tools and/or equipment
   - Operation of motor vehicles
   - Exposure to high voltage electrical systems
   - Exposure to extreme weather and high-speed traffic

   MENTAL
   - Comparing data
   - Computing arithmetic operations
   - Compiling information, analyzing, coordinating, synthesizing, negotiating, instructing (Analytical tasks)

- Ability to multi-task
- Ability to make Judgments and Recommendations
- Dealing with the public on a regular basis
- Interpersonal skills/behaviors
- Demands for accuracy in all aspects of work
- Communicating in writing, in person and over the phone (ability to write written reports and give oral presentations)
- Operating a personal computer
- Ability to meet inflexible deadlines

2. ***Does this position supervise others?*** ☐ **Yes** ☑ **No**

3. ***Attach an Organizational Chart.***

SECTION III - Minimum Qualifications - List minimum requirements for the first day of work.

Critical knowledge and skills required for this position:

KNOWLEDGE:

Extensive knowledge of civil engineering concepts, theories, and practices with specific emphasis on traffic engineering. These concepts, theories, and practices relate to Multimodal Traffic Operations: Statutory Codes concerning traffic control, Intersection and Interchange Geometrics, Highway Geometrics, Pavement Delineation, Signs, and Traffic Signal Control.

Those elements must be coupled with extensive knowledge of analytical techniques including (engineering mathematics, basic statistics, crash analysis, roadway and intersection capacity, and graphic analysis), dynamics of vehicular motion, problem solving, study procedures, design procedures, and traffic control software and hardware and their function.

Thorough knowledge of standards, techniques, and guidelines presented in the Manual on Uniform Traffic Control Devices, AASHTO Policies, and in the departments Traffic Engineering Manual and Road Design Manual.

SKILLS:

Skill in the use of engineering instruments in the field (automated speed and traffic volume counters, mio-vision cameras, and vehicle mounted distance measuring intrument (DMI)). Skill in the use of computer software programs (Microstation-Cadd, Microsoft Word, Microsoft Excel, Highway Capacity Software, TEAPAC (Transyt 7f, Passer, Netsim, Signal 2000), Synchro etc. Skill in the operation of traffic signal control devices. Skilled in the development of work plans, division of labor among a working team of professionals, and use of organizational tools to promote effective group communications (ie. Microsoft Office "Outlook").

Behaviors required to perform these duties:

See MDT Core Behaviors

Education:
Check the one box indicating minimum education requirements for this position for a new employee the first day of work:

- ☐ No education required
- ☐ High school diploma or equivalent
- ☐ 1-year related college/voc. training
- ☐ Related AAS/2-years college/vocational training
- ☑ Related Bachelor's Degree
- ☐ Related Master's degree

Please specify the acceptable fields of study:
Acceptable: Civil Engineering, Electrical Engineering, or a related engineering degree.

Other education, training, certification, or licensing required (specify): PE registration is required

Experience:
Check the one box indicating minimum work-related experience requirements for this position for a new employee the first day of work:

- ☐ No prior experience required
- ☐ 1 year
- ☐ 2 years
- ☐ 3 years
- ☐ 4 years
- ☑ 5 or more years

Other specific experience:

Five years of transportation engineering experience is required, with at least four of those years in the field of Traffic Engineering as it relates to project design and traffic operational analysis.

Alternative Qualifications:
This agency will accept alternative methods of obtaining necessary qualifications.

☐ Yes ☑ No

SECTION IV – Other Important Job Information

- ☐ Fingerprint check
- ☐ Background check
- ☑ Valid driver's license
- ☐ Other; Describe

Other information including working conditions such as shifts, lifting requirements, travel or hours.

The fieldwork is performed in a place surrounded by heavy vehicle traffic volumes, exposure to the elements, and exposure to high voltage electrical systems. Some physical tasks are required such as ability to use a hammer and carry heavy equipment such as automatic counters. Some travel including overnight or longer is required.

SECTION V – Signatures

Signature indicates this statement is accurate and complete.

Employee:

Name: _____ Title: _____

Signature: _____ Date: _____

Immediate Supervisor:

Name: _____ Title: _____

Signature: _____ Date: _____

Bureau Chief:

Name: _____ Title: _____

Signature: _____ Date: _____

Division/District Administrator:

Name: _____ Title: _____

Signature: _____ Date: _____

Department Designee:

Brent Rabe/Designee

Human Resources Administrator
Human Resources Division

Signature: _____ Date: _____